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Project's Title	Analysis of potential neurodegenerative metabolites and neurotrophic factors in diabetic retinopathy
Brief Introduction	Research problem: Diabetic retinopathy is the major complication of diabetes and the leading cause of blindness among working adults worldwide. The prevalence of diabetic retinopathy is increasing and predicted to double over the next 30 years worldwide as well as in Saudi Arabia. Still, there is no treatment for early stages of diabetic retinopathy.The growing incidence of diabetic retinopathy requires new approaches to understand the pathophysiology of the disease in order to improve detection, prevention and treatment at its earliest stage rather than wait for the onset of vision threatening lesions. Objective: The overall objective of this proposal is to elucidate the cellular and molecular mechanism of diabetic retinopathy by detecting key metabolites/factors involved in the disease progression in order to find molecular targets for early intervention of the disease. The objective will be to analyze the metabolites and neurotrophic factors in streptozotocin induced diabetic rat's serum and retina.
Methodology	Scientific approaches: We will determine levels of potential neurodegenerative metabolites and neurotrophic factors in the serum and retina of diabetic rats and compare with non-diabetic controls and explore neurodegenerative pathways to find molecular targets for neuroprotection. Research methodologies: We will measure the level of metabolites and neurotrophic factors using biochemical, HPLC and ELISA techniques. Furthermore, we will analyze the expression and regulation of those neurotrophic factors using ELISA and immunoblotting techniques. In addition we will measure oxidative stress and apoptosis in those diabetic retinas using biochemical techniques. Expected results:

	We expect that results from this proposed study will identify potential metabolite(s)/neurotrophic factor(s) as a biomarker which might cause damages to retinal neurons and give molecular basis of neurodegeneration early in the diabetic retina. Targeting disrupted metabolism or neurotophic factors/signaling through them in diabetic retina could be the potential therapeutic approaches towards ameliorating neuronal damage the early sign of diabetic retinopathy.
The project is applicable within (months)	12
References	Ola MS, Mohd Imtiaz Nawaz, Haseeb A. Khan, Abdullah S. Alhomida Neurodegeneration and neuroprotection in diabetic retinopathy Int. J. Mol. Sci. 2012, 13 in press Ola MS, Mohd Imtiaz Nawaz, Marwan Abdulrahman Abouammoh, Abdullah S. Alhomida , Haseeb A. Khan Novel drugs and their targets in the potential treatment of diabetic retinopathy. Medical Science Monitor, submitted Ola MS, Nawaz MI, Siddiquei MM, Al-Amro S, Abu El-Asrar AM. J Diabetes Complications. 2012 Jan-Feb;26(1):56-64. doi: 10.1016/j.jdiacomp.2011.11.004. Epub 2012 Jan 5 .Recent advances in understanding the biochemical and molecular mechanism of diabetic retinopathy. Ola MS, Hosoya K, LaNoue KF.Regulation of glutamate metabolism by hydrocortisone and branched chain keto acids in cultured rat retinal Müller cells (TR-MUL). Neurochem Int. 2011 Oct;59(5):656-63. Epub 2011 Jul 3. Ola MS, Hosoya K, LaNoue KF. Related citationsInfluence of insulin on glutamine synthetase in the Müller glial cells of retina. Metab Brain Dis. 2011 Sep;26(3):195-202. Epub 2011 May 31 Ola MS, Berkich DA, Xu Y, King MT, Gardner TW, Simpson I, LaNoue KF. Analysis of glucose metabolism in diabetic rat retinas. Am J Physiol Endocrinol Metab. 2006 Jun;290(6):E1057-67. Epub 2005 Dec 27.